EATON | Holec

Innovac MMS 3.6 - 24 kV

Product Focus

- High reliability
- Maximum safety
- Minimum maintenance
- Easy to automate
- Environmentally friendly technology

Compact & in double busbar

Creating Solutions

Eaton Holec creates power-engineering solutions assuring safe and reliable supply of electrical energy. With manufacturing subsidiaries and sales organisations world-wide, Eaton Holec focuses on electrical distribution and power supply in both low and medium voltage ranges.

Eaton Holec

The medium voltage activities of Eaton Holec are directed towards switchgear installations and components for applications in distribution networks (main and substations, transformer stations) and for industrial power supply. The switch-gear systems are air or epoxy-resin insulated and are in most cases equipped with circuit-breakers based on Eaton Holec vacuum interrupters. Eaton Holec thus offers an extensive range of switchgear systems and switchgear components, ensuring a safe and reliable distribution of electrical energy.

Innovac MMS power distribution, Kivenlahden, Espoo, Finland

When continuity counts

Optimal availability of electrical power is becoming increasingly important. Deregulation of the power market is forcing energy companies to be more and more economical in their operations. This puts the main emphasis on efficiency, while at the same time ever tougher requirements are being set for the quality and continuity of energy supplies. The availability of energy is one of the primary criteria in investment decisions because the tariff structure also takes these sorts of factors into account and because it is becoming more and more a matter of supplying a product together with the associated liability. There is also a tendency towards automation of substations and the grid as a whole, and even greater integration of ICT into business processes. Eaton Holec is meeting the requirements and demands of the deregulated energy market with its modern range of Innovac MMS compact double busbar installations.

Innovac MMS advanced compact double busbar

Installations are the best way to satisfy the needs for reliable medium voltage switchgear systems in the 3.6 kV to 24 kV range. MMS double busbar installations guarantee a very high level of availability of electrical energy supply and superb reliability. This makes MMS ideal for applications in main and substations in the energy distribution sector and in industry.

Innovac MMS double busbar solution, Vantaan Energia, Finland.

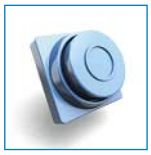
Reliable applications

A well-designed system

The new Innovac MMS double busbar system is the result of an effective response to market needs combined with the electrical engineering know-how and experience that Eaton Holec has built up over many years. By using the latest technologies, Eaton Holec has succeeded in combining optimal availability with a compact, low maintenance design. Operator safety and ergonomic aspects also received a great deal of attention. MMS stands out from an environmental point of view as well. The use of vacuum switching and the combination of cast resin and air for insulation are good examples of environmentally friendly technologies. These advantages, together with the wide range of panel versions and options for automation and extension, make MMS a well-designed system suitable for every specific application.

Safe and reliable

Entirely in line with other Innovac products, this new range of MMS systems is equipped with fixed-type circuit-breakers. Vacuum is used as a switching medium. Vacuum interrupters are completely maintenance free and guarantee a long and reliable service life. This makes them ideal for use in fixed systems. MMS circuit-breakers are never-theless easy to replace.



User friendly operation

Eaton Holec's MMS switchgear is easy to operate. Easy access to primary and secondary cable connections makes the MMS very straightforward to connect. The logically arranged, user-friendly control panel and the newly developed user interface for mechanical emergency operation enable operators to do their job as effectively as possible.

Respect for the environment

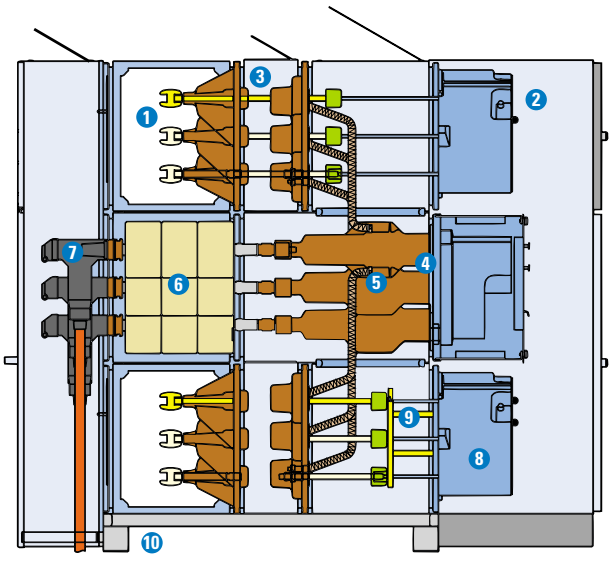
In keeping respect with Eaton Holec's positive attitude to its social responsibilities, Innovac MMS is an environmentally friendly system. This is reflected, for example, in the use of environmentally friendly materials such as epoxy resin for components and as an insulating medium, air instead of SF_6 gas as an insulating medium, and vacuum as a switching medium. Consequently, MMS can be completely recycled at the end of its life without any problem. Naturally, Eaton Holec acts entirely in accordance with the rules and procedures of the ISO 14001 environmental certificate during the development and production processes.

Innovac MMS-switchgear, Nuon, The Netherlands.

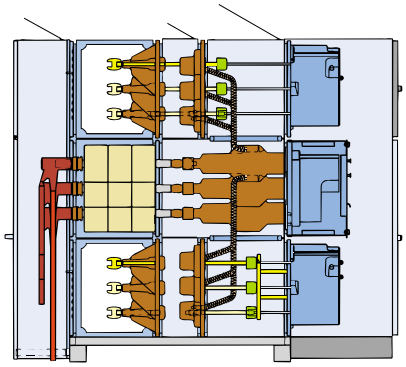
Double busbar for optimal availability

When developing the new series of Innovac MMS systems, Eaton Holec deliberately opted for the 'double busbar principle' because double busbar installations have a number of significant advantages over single busbar and duplex medium voltage switchgear systems:

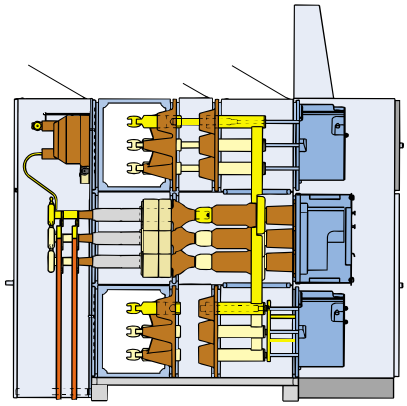
- Double busbar installations offer a very high level of availability because the outgoing cables can be changed over from one busbar system to the other without loss of power. This can be done electrically or completely automatically by remote control.
- Double busbar installations make it possible to distribute available transformer capacity in the most economic way.
- Short-circuit capacity can be divided between both busbar systems.
- Double busbar installations allow the voltage level for each busbar system to be adjusted independently.
- Prefered and non-prefered feeders can be divided between two different busbar systems.
- Because the double busbar is redundant, the installation is easy to put back into operation again relatively quickly after an internal fault.
- MMS double busbar installations are internal arc-proof per compartment and therefore comply with current IEC publication 60298 Appendix AA. This feature also anticipates future additional capacity requirements.
- Double busbar installations are conveniently arranged and easy to operate from the front.



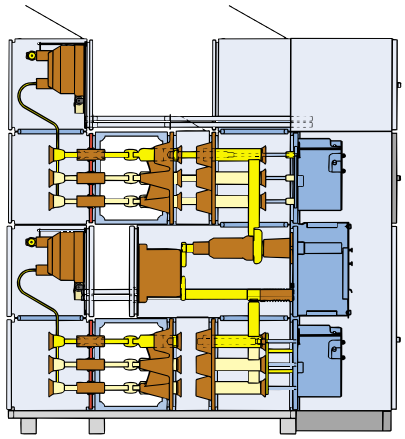
1. Busbar system
2. Secondary compartment
3. Disconnector compartment
4. Arc-proof barrier
5. Vacuum circuit-breaker
6. Current transformers
7. Cable compartment
8. Disconnector and earthing switch mechanism
9. Integrated earthing switch
10. Supporting frame



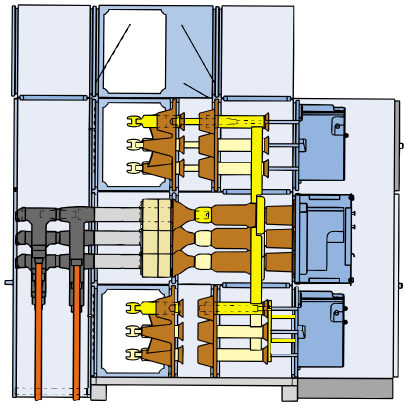
630 A cable feeder panel with Raychem T-connectors and surge arresters.



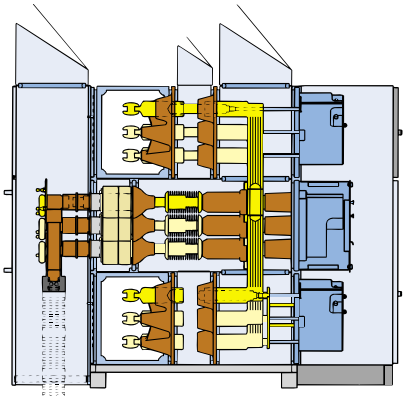
1600 A cable feeder panel with arc shield, open cable connection and cable-side voltage transformers.



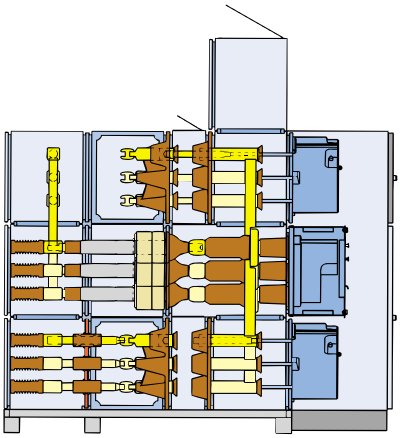
2000 A buscoupler panel with busbar-side voltage transformers and facility for busbar earthing.



2000 A cable feeder panel with Euromold T-connectors suitable for 2000 A and arc channel.



3150 A cable feeder panel with universal busbar connection.



2000 A sectionalizer panel.

Double busbar - the most economical solution

An MMS double busbar installation offers more than just optimal availability. Compared with single busbar and duplex medium voltage switchgear systems, it is also the best investment choice:

- In terms of initial costs alone, a double busbar installation is significantly more cost-effective than two single busbar installations.
- The installation costs of an Innovac MMS are also lower than those of a duplex installation. An MMS installation is very easy to assemble and the primary cables only need to be connected once. In addition, the relatively expensive busbar connection from one installation to the other needed in a duplex installation is superfluous to an MMS system.
- MMS also offers important operational cost advantages. MMS is easy to automate and the whole system can then be operated remotely. This generates significant savings in travel costs, time and of course, makes for a higher level of availability. Several substations can be operated from the central control room.
- A double busbar installation normally has the same functionality as a duplex installation. However, an MMS installation takes up much less floor space, which can lead to savings on building costs. Manoeuvring in and out with circuit-breakers mounted on a truck is also a thing of the past.

Innovac MMS power solution, Copenhagen Airport, Denmark.

Incoming feeder substation.

Safety first

Fixed-type circuit-breakers

For energy distribution companies, the safety of its personnel is of prime importance. Because the design features fixed circuit-breakers which offer the advantage of remote operation capability, manoeuvring in and out with circuit-breakers is not required anymore. This considerably increases the safety of operators, who would otherwise have to carry out all sorts of local switching procedures. In addition, all primary parts are insulated and located completely separate from the operating mechanism and the secondary compartment. This type of design guarantees a very high level of safety.

Optimal separation

MMS achieves optimal separation between the cable and busbar system by means of a disconnector. Using an integrated earthing switch, safety is enhanced by an earthed barrier between the cable and busbar system. The design of the new disconnector compartments is based on a raised impulse withstand voltage. As a result, an MMS installation in operation can be extended simply and safely.

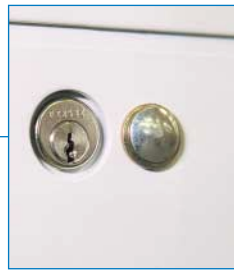
Compact design

Innovac MMS features a compact design.
As the world's most compact air-insulated medium voltage switchgear system up to 24kV, MMS is based on experience and knowledge gained over many years in the areas of cast resin technology, vacuum technology and electrical field control. MMS utilizes optimal field control through the special design of all primary components such as the main busbars.
The result is a particularly compact design.

The 12 kV and 24 kV versions are both accommodated in the same compact housing. This means substantial savings on building costs because the same installation can be used when the operating voltage is increased. This must, of course, be stated in the installation specification when the order is placed.

Its compact design also makes MMS highly flexible and economically attractive when existing installations are being replaced.

Key release facility for cable compartment access.



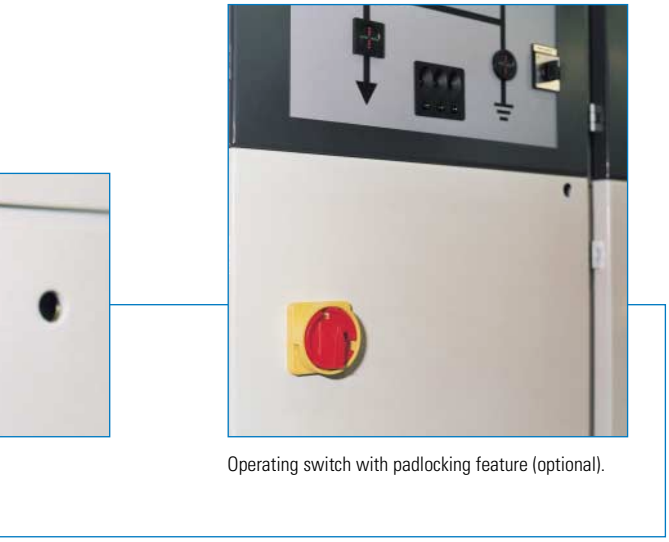
Key lock on the cable compartment.

Innovac MMS is suitable for compact substations.

Unique key procedure

If the cable compartment needs to be opened, a key procedure must be followed so that work on the cable is always done when the cable is safely earthed. To do this, the cables of the relevant field must be earthed using the integrated earthing switch and the short-circuit-proof vacuum circuit-breaker. The cable compartment of the relevant field can then be safely opened using the released unique key of the circuit-breaker and earthing switch in the "on" position.

As an alternative to this key procedure, it is also possible to opt for an operating switch that can be locked with a padlock. Here, cable release takes place remotely using the integrated cable earthing procedure. Before the cable compartment can be opened, the secondary circuit of the relevant field must be switched off and the operating switch must be padlocked in the 'off' position.



Operating switch with padlocking feature (optional).

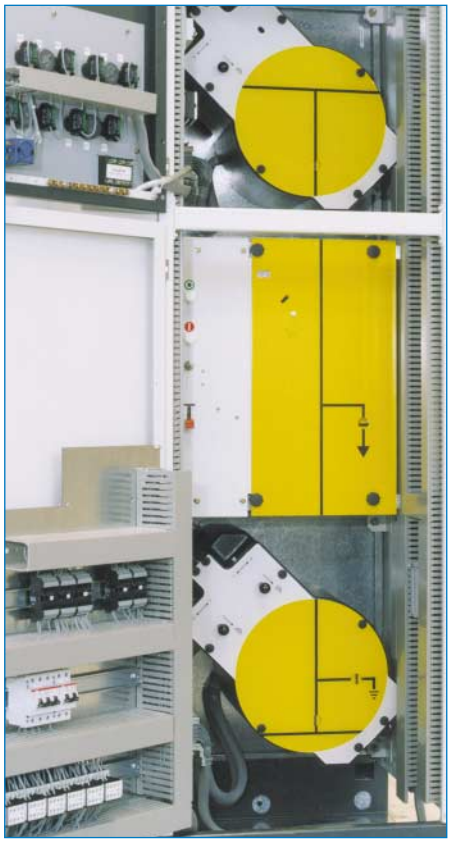
Ergonomic user interface

Innovac MMS is an electrically operated system, which makes it ideal for remote operation. In this case all secondary equipment is powered by a local auxiliary supply unit The design of this type of system is always based on a very high level of availability, which is achieved by, for example, making these systems redundant. If, despite all these precautions, these facilities do break down, an MMS installation can still be operated safely. The emergency operation of the disconnectors, circuit-breaker and earthing switch has a clear and ergonomically designed user interface, with the emphasis on the safe operation of the MMS installation.

Internal arc resistance

Although the design virtually eliminates the chance of an internal arc, the system has been fully tested at KEMA in accordance with IEC 60298 appendix AA. MMS can also be equipped with an arc detection system. In the event of an open arc, this minimises damage to the switchgear and the substation building. The MMS can also be supplied with an additional busbar system safeguard in the form of upstream blocking, whereby if an open arc occurs, the circuit-breaker of the incoming feeder panel is switched off super-fast, which reduces even further the duration of the arc and any resultant damage.

Arc detection system.

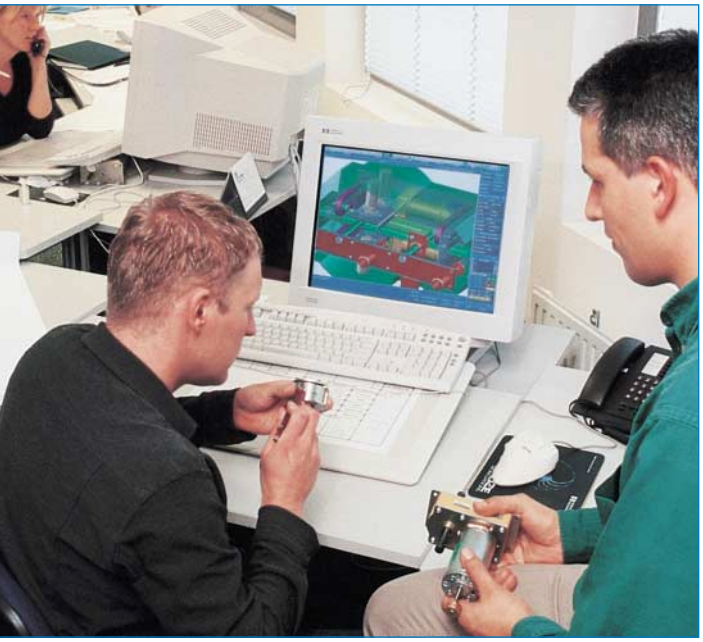


Ergonomic user interface for emergency operation.

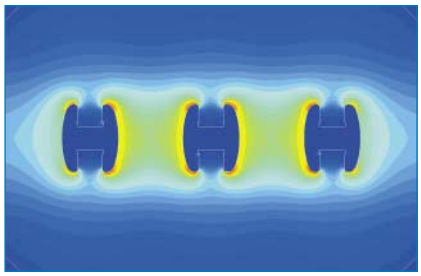
State-of-the-art technology

MMS has a long economic and technical life. This is a reflection of the way it has been developed and manufactured. Besides the use of epoxy resin, vacuum technology and electrical field control, the development of MMS also involved the most innovative design techniques. This has resulted in an installation with a minimum number of parts, which significantly reduces the chance of faults occurring.

The latest design methods employed in the development of MMS include DFA, simulation techniques and 3D design. All orders are processed using modern logistical processes like ERP. Needless to say, development and manufacturing is in accordance with ISO 9001.

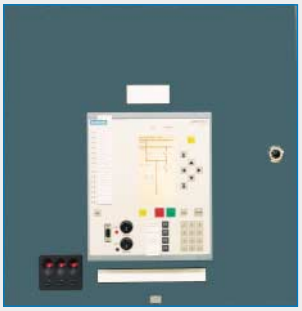


Designers working with an advanced 3D CAD system.



Electrical field of an MMS main busbar system.

ABB type REF protection relay.

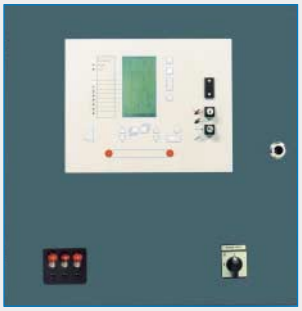


Siemens type Siprotec protection relay.

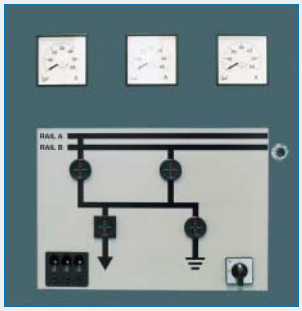
Exactly how you want it

Every application of this type of system is unique, so Eaton Holec offers a large number of different panel types and field versions. Thanks to the large number of protection and control options you will always be able to find an MMS installation that conforms exactly to your specifications. The extensive Innovac MMS range means that the equipment can almost always be fitted into new construction projects as well as refurbishment projects. If, in due course, you want additional capacity in the form of more panels, MMS can easily be extended to the right or left while in operation.

Busbar connection.



SEG type CSP 1-1-5 protection relay.



Single line diagram with position indication.

Easy integration into automated substations

An Innovac MMS system is easy to automate. This system is ideally suited to an automated environment and there is obviously a preference for international standards such as the open control and communication protocol in accordance with IEC 60870. MMS can always be integrated into an existing automated environment as well. As an independent partner, Eaton Holec will be pleased to advise you on any matter, whether it will be refurbishment or expansion of an existing sub-station. We will be happy to submit a tender for the entire project.

Inside of panel door with secondary and protection relay.

Innovac MMS was developed for application in an automated environment.

Cable connection.

The MMS system can be read out and operated without any problems using SCADA systems. Innovac MMS also offers great flexibility with respect to protection relay manufacturers. The equipment you prefer can be integrated without any difficulty. The system is also suitable for both serial field bus systems and conventional wiring methods.

MMS has been EMC tested in accordance with the applicable IEC standards.

Complete MMS-switchgear for Turku Energia, Finland.

User friendly operation

Number one is a good, reliable installation. Number two is an installation that is convenient and efficient to operate. This second aspect does not always get the attention it deserves, but at Eaton Holec it most certainly does. Easy access to primary and secondary cable connections helps to make the new MMS very straightforward to connect. Connecting the cables is very easy, with the open cable connection for cable sockets or with the DIN standard cones for T-connectors from various manufacturers (like Raychem or Euromold, for example). Once the installation is operational, the cables are readily accessible for all kinds of purposes, such as measuring, earthing, testing etc.

You can also choose from a number of different makes of insulated busbar systems for connecting feeders to transformers, for instance.

Innovac MMS is very easy to operate. The logically arranged, user-friendly control panel and the newly developed user interface for mechanical emergency operation enable operators to do their job as effectively as possible.

Duresca busbar connection.

Euromold 24 kV cable connection with T-connectors.

‘Fit and forget’

The overall cost throughout the entire service life of equipment is becoming an increasingly important factor in major investment decisions. Maintenance costs are a significant element in this. Here too, Innovac MMS excels. Our ‘fit and forget’ philosophy means that all primary parts are maintenance-free for life. Similarly, you need have no concerns for the moment about the disconnector and circuit-breaker mechanisms, because all MMS mechanisms are maintenance-free for the first ten years. And after all, if there is any need for inspection or maintenance, the well-designed separation of the primary section and the mechanisms makes the mechanisms safe and easy to reach through the secondary compartment.

Testing the LED voltage indication.

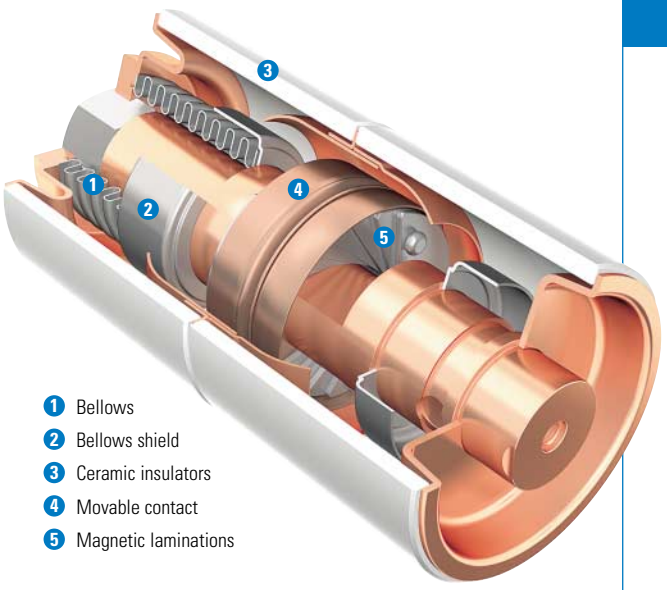
Vacuum technologie

The vacuum interrupters developed by Eaton Holec are the very core of the Eaton Holec vacuum circuit-breakers used in the Innovac MMS system.

The vacuum circuit-breaker

The vacuum circuit-breaker was specially developed by Eaton Holec and has the following features:

- Small dimensions, takes up little space
- Explosion-free
- Suitable for numerous operations
- No external switching phenomena
- Rapid dielectric recovery ensures circuit interruption at the first current-zero
- Low maintenance requirements
- Long service life



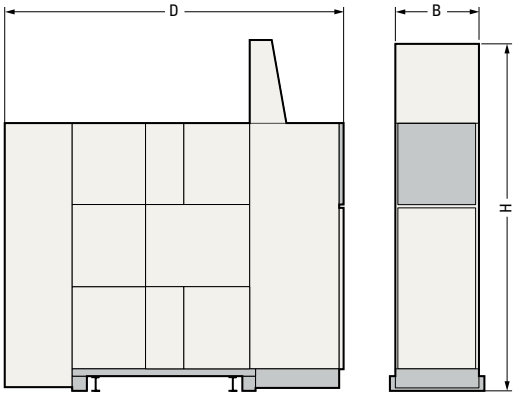
1. Bellows
2. Bellows shield
3. Ceramic insulators
4. Movable contact
5. Magnetic laminations

Technical data

Rated voltage	kV	12	17.5	24
General				
impulse withstand voltage	kV	75	95	125
power frequency withstand voltage	kV	28	38	50
rated frequency	Hz	50 - 60	50 - 60	50 - 60
protection factor	IP	3XD [1]	3XD [1]	3XD [1]
arc resistance 0.5s (optional 1s)	kA	31.5	31.5	25
Busbar system				
rated current	A	2000/3150	2000/3150	2000
rated short-term withstand current	kA - s	31.5 - 3	31.5 - 3	25 - 3
rated peak withstand current	kA	80	80	63
Circuit-breaker				
rated current	A	3150	3150	2000
rated short-term withstand current	kA - s	31.5 - 3	31.5 - 3	25 - 3
rated breaking current	kA	31.5	31.5	25
DC component	%	35	35	35
rated short-circuit making current	kA	80	80	63

[1] N.B.: A higher degree of protection is possible as an option.

Main dimensions and weights



Double busbar installation	Rated voltage (kV)	Nominal current (A)	H (mm)	B (mm)	D (mm) [1]	Weight per panel (kg)
Outgoing/incoming cable feeder panel						
	24	up to 800	2570	600	2165 - 2480 [1]	725
	24	1250 - 2000	2570	600	2165 - 2730 [1]	1100
	17.5	3150	2570	1000	2330 - 2730 [1]	1500
Sectionalizer panel						
	24	max. 2000	2570	1400	2350 - 2500	2000
	17.5	3150	2570	4000	2350 - 2500	1300
Buscoupler panel						
	24	max. 2000	2570	1000	2350 - 2500	1600
	17.5	2500	2570	2000	2350 - 2500	1300
	17.5	3150	2570	2000	2350 - 2500	1500

[1] Depending on the number and type of cables.

Quality

Eaton Holec Middenspanning has been meeting the ISO 9001 and BS 5750 quality assurance requirements since 1989. This quality assurance system calls for a periodic evaluation of the organizational structure, the assignment of responsibilities and the associated procedures. It also guarantees corrective action and activities when required. This keeps the quality assurance system up to standard and enables adjustments to be made and further development to take place where necessary.

Standards

Innovac MMS complies with the following standards:

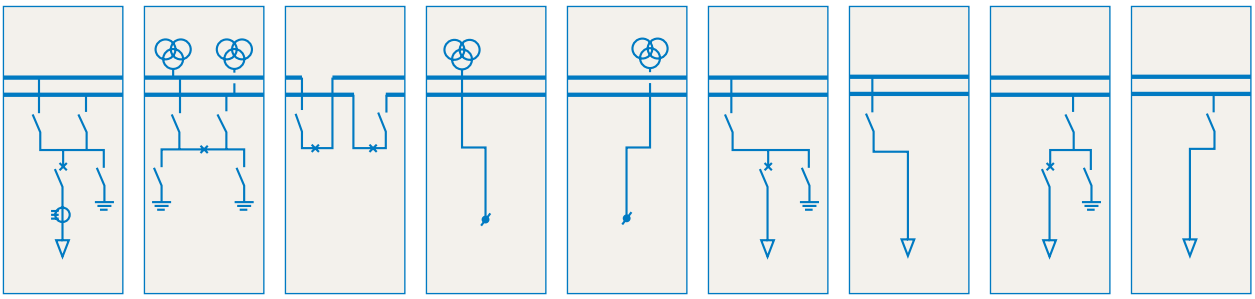
- IEC publication 60298 MMS complies with the designation 'Metal-clad'.
- Internal arc resistance: Innovac MMS has been fully tested in accordance with IEC publication 60298, appendix AA.
- Personal safety: Innovac MMS complies with IEC publication 60529 (IP degree of protection). As far as type testing is concerned, the system has of course been fully certified by KEMA.

All the medium voltage components used in the system comply with the following standards:

- Circuit-breakers: IEC 60056
- Current transformers: IEC 60044-1
- Voltage transformers: IEC 60044-2
- Earthing switches and disconnectors: IEC 60129

Innovac MMS is suitable for use in areas under normal conditions as described in IEC publication 60694 section 2.1. Current and voltage need to be converted for conditions other than these.

Panels



Cable feeder. Buscoupler. Sectionalizer. Direct busbar connection (upper busbar). Direct busbar connection (lower busbar). Upper busbar connection (installation A). Upper busbar connection (installation B). Lower busbar connection (installation A). Lower busbar connection (installation B).

Eaton Holec - your complete partner

Your order is in good hands with Eaton Holec. You can, of course, purchase an MMS installation and take care of the assembly and testing on location yourself. A clear and comprehensive service manual tells you everything you need to know. If, however, you do not have your own technical department or you prefer to outsource the commisioning and testing on site for other reasons, you can call on the Holec Service Organization. This organization's wealth of experience and expertise makes it a valuable partner for you to have in-house. It has all the expertise, tools and test equipment required.

You can also look to us for turnkey solutions. Eaton Holec has a large number of specialists in all the relevant fields and can take care of the entire project for you, in close collaboration with your own organisation and any other parties you may select. Eaton Holec's participation offers you the choices you have a right to expect from an experienced partner.

Turnkey project at Essent in Emmen, The Netherlands.

Application

The Eaton Holec Innovac MMS system is ideally suited for use in switching and distribution installations in distribution networks and as industrial and building site switchgear. The system guarantees reliable switching, protection, metering and distribution of electrical energy.

The Innovac MMS system is used in distribution networks in installations which are generally located further up the network to the main plant, such as:

- Power plants
- Main distribution stations
- Heavy industries
- Airports

Innovac MMS, Nuon Amsterdam, The Netherlands.

Eaton's Electrical business is a global leader in electrical control, power distribution, and industrial automation products and services. Through advanced product development, world-class manufacturing methods, and global engineering services and support, Eaton's Electrical business provides customer-driven solutions under brand names such as Cutler-Hammer®, Durant®, Heinemann®, Holec® and MEM®, which globally serve the changing needs of the industrial, utility, light commercial, residential, and OEM markets. For more information, visit www.eatonelectrical.com.

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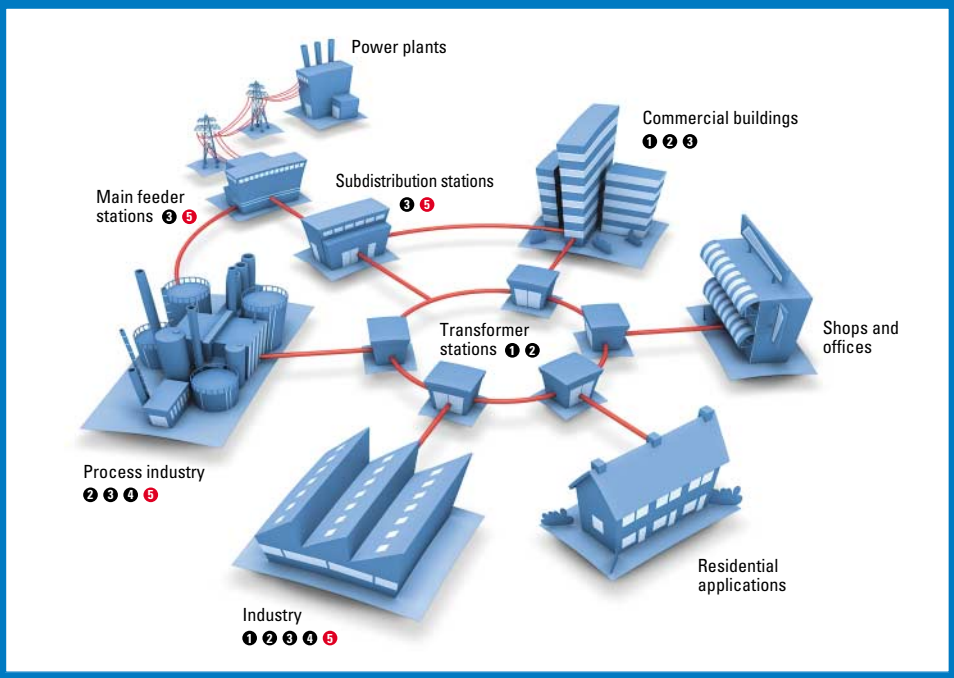
Eaton Holec medium voltage products in the energy chain, from generation to supply to the consumer.



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Eaton Electric N.V.
P.O. Box 23
7550 AA Hengelo
The Netherlands
Tel.: +31 74 246 40 10
Fax: +31 74 246 40 25
holec-info@eaton.com

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www.eatonelectrical.com

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Internet: www.moeller.pl

Biura:

Eaton Electric Sp. z o.o.
80-299 Gdańsk, ul. Galaktyczna 30
tel.: (0-58) 554 79 00, 10
fax: (0-58) 554 79 09, 19
e-mail: pl-gdansk@eaton.com

Biuro Katowice
40-203 Katowice, ul. Roździeńskiego 188b
tel.: (0-32) 258 02 90
fax: (0-32) 258 01 98
e-mail: pl-katowice@eaton.com

Biuro Poznań
60-171 Poznań, ul. Żmigrodzka 41/49
tel. (0-61) 863 83 55
tel./fax (0-61) 867 75 44
e-mail: pl-poznan@eaton.com

Biuro Warszawa
02-146 Warszawa, ul. 17 Stycznia 45a
tel. (0-22) 320 50 50
fax (0-22) 320 50 51
e-mail: pl-warszawa@eaton.com

Przedtsawiciele handlowi

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Eaton Electric Sp. z o.o.
80-299 Gdańsk, ul. Galaktyczna 30
tel.: (0-58) 554 79 00, 10
fax: (0-58) 554 79 09, 19
e-mail: pl-gdansk@eaton.com

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